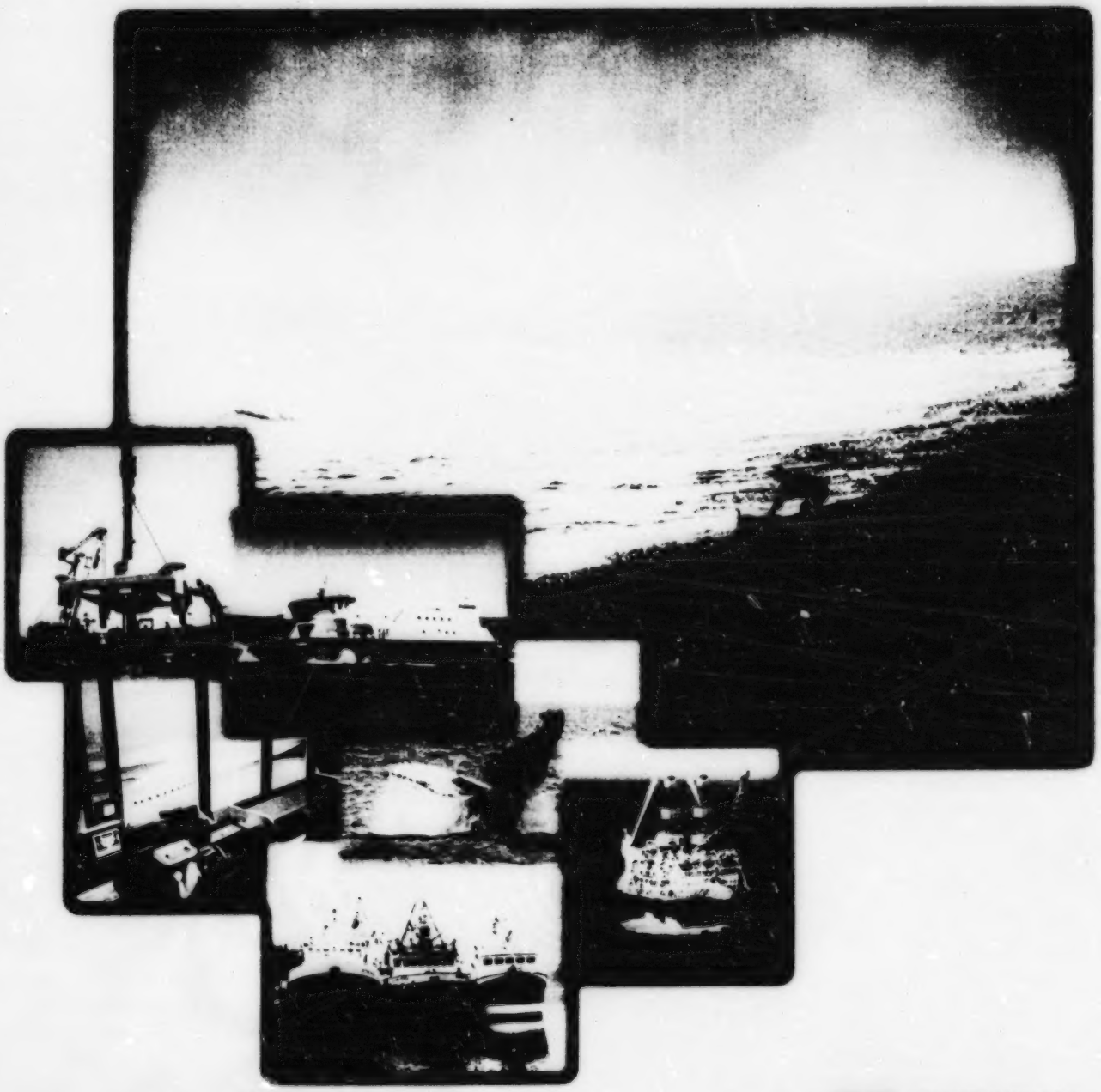
Estimating the Value of the Marine, Coastal and Ocean Resources of Newfoundland and Labrador



Canada

GOVERNMENT OF
NEWFOUNDLAND
AND LABRADOR

103-00295/

ESTIMATING THE VALUE OF THE MARINE, COASTAL AND OCEAN RESOURCES OF NEWFOUNDLAND AND LABRADOR

(FOR THE PERIOD 1997 TO 1999)

Economics and Statistics Branch
Department of Finance
Government of Newfoundland and Labrador
March 2002

Estimating the Value of the Marine, Coastal and Ocean Resources of Newfoundland and Labrador was prepared by the Economics and Statistics Branch, Department of Finance for Fisheries and Oceans Canada - Science, Oceans and Environment Branch (www.nfl.dfo-mpo.gc.ca) and the Department of Fisheries and Aquaculture (www.gov.nf.ca/fishaq). All data is current as of September 30, 2001. The Economics and Statistics Branch can be reached as follows:

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ACKNOWLEDGEMENTS

This report was completed by the Economics and Statistics Branch, Department of Finance for Fisheries and Oceans Canada and Newfoundland and Labrador's provincial Department of Fisheries and Aquaculture.

The Economics and Statistics Branch wishes to acknowledge the following individuals for their contribution and effort toward this study.

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Federal Government

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Atlantic Canada Opportunities Agency
Canadian Environmental Assessment Agency
Canadian Food Inspection Agency
Canadian Heritage - Parks Canada
Canadian International Development Agency
Canadian Transportation Agency
Citizenship and Immigration Canada
Department of Foreign Affairs and International Trade
Department of National Defence
Environment Canada
Fisheries and Oceans Canada

Health Canada
Human Resources Development Canada
Indian and Northern Affairs Canada
Industry Canada
International Development Research Centre
Justice Canada
Marine Atlantic
National Energy Board
National Research Council
Natural Resources Canada
Office of Critical Infrastructure Protection and Emergency Preparedness
Public Works and Government Services Canada
Royal Canadian Mounted Police
Transport Canada

Provincial Government

Department of Environment
Department of Fisheries and Aquaculture
Department of Human Resources and Employment
Department of Industry, Trade and Rural Development
Department of Mines and Energy
Department of Tourism, Culture and Recreation
Department of Works, Services and Transportation
Department of Youth Services and Post-Secondary Education
Memorial University of Newfoundland (and affiliated faculties and institutes)

Federal-Provincial Partnerships

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GLOSSARY OF TERMS

Econometrics. An area of economics that combines economic theory and statistical principles/methods in order to develop mathematical estimates of key economic relationships (e.g., an estimate of the relationship between consumer spending and income).

Goods Sector. Is a classification term for those industries that produce goods for local consumers or for export. It includes agriculture; logging and forestry; fishing and trapping; mining; crude petroleum; utilities (electric power, gas and water); construction; and manufacturing. These industries are often collectively referred to as the Good Producing Industries.

Gross Domestic Product (GDP). A measure of the value of all goods and services produced within the province in a given period. GDP measures the size of the economy and whether it is growing. Statistics Canada estimates GDP in two ways. First, GDP at market prices which values GDP by totalling the expenditures required to purchase the goods and services produced. This method is often referred to as GDP from the expenditure side. Second, GDP at factor cost which values GDP by summing the payments made to the owners of the factors used in production (i.e., land, labour and machinery/buildings) inclusive of profit, which is the factor payment to entrepreneurs. Also referred to as GDP from the income side. GDP at factor cost equals GDP at market prices less indirect taxes and subsidies.

Multiplier. A number used to determine the impact of an event/project/industry on the economy. The ratio of total change in output or employment to the initial change (or direct change). For example, if an industry were to create 100 new jobs, it would require materials and services from its supplying industries. If this increase in demand created 30 new jobs in the supplying industries, the employment multiplier would be 1.3 [i.e., 100 (direct) + 30 (spinoff)].

Services Sector. Is a classification term for those industries that produce services for local consumers or for export. It includes transportation and storage; communication; wholesale/retail trade; finance, insurance, and real estate; community, business and personal services; and public administration. These industries are often collectively referred to as the Service Producing Industries.

EXECUTIVE SUMMARY

Newfoundland and Labrador, including its culture, settlement patterns, and economy, has developed from its association with the ocean. Today, over 90 per cent of the province's population live adjacent to or within a few kilometres of the ocean. In this context, and given the increasing utilization of marine, coastal and related resources, there is increased emphasis on defining, protecting and preserving these assets. There is also a need to better understand their importance and contribution to the economy.

The provincial Department of Fisheries and Aquaculture and Fisheries and Oceans Canada are seeking to determine the economic value of oceans, marine and coastal activity (i.e., the oceans sector) in the province. Economic value can be derived from ocean resources and from use of the ocean as a means of movement, operation, business activity, and innovation. Estimating this value is important for policy development and management decisions at both the federal and provincial level, and in understanding the role and importance of industries and other stakeholders vis-à-vis their economic contributions in the oceans sector.

This study, completed by the provincial Department of Finance, attempts to estimate the economic value of the oceans sector to the provincial economy. Using 1997-1999 as the reference period,[1] this study includes both private sector industries (i.e., oil and gas, fishery, aquaculture, shipbuilding, boatbuilding, marine tourism and recreation, marine transportation, and oceans technologies) and federal and provincial public sector oceans-related departments and agencies.

The economic impacts of an activity or project encompass a wide array of indicators such as Gross Domestic Product (GDP), labour income (wages and salaries plus supplementary labour income such as employers' portion of mandatory employment programs and pension contributions) and employment. To calculate economic impacts, the Department of Finance used the Newfoundland and Labrador Econometric Model and multipliers from the provincial Input-Output Model.

For the purposes of this study, economic impacts are separated into three components:

- **Direct impacts** are labour income and business profits earned as a result of working directly on a given activity or project;
- **Indirect impacts** are generated when other firms supply goods and services to the direct activity or project; and
- **Induced impacts** are generated when the direct and indirect employees and business owners spend their incomes on other areas of the economy which leads to increased retail sales, housing starts and other expenditures.

[1] Fiscal years 1997/98 to 1999/2000 for public sector entities.

GDP Impact. The direct GDP impact of oceans-related activity averaged about $1.38 billion from 1997 to 1999 or 14.1 per cent of total economic activity which averaged $9.8 billion. Total GDP impact, including direct, indirect and induced effects, averaged about $2.59 billion over this period, or 26.5 per cent of total economic activity. The most significant private sector industries, in terms of total GDP impact, were offshore oil (production, development and exploration) at 11.9 per cent of GDP and the fishery (harvesting and processing) at 8.2 per cent.[2] Total public sector oceans-related activity contributed 2.2 per cent of GDP.

Summary of Economic Impacts
Oceans Related Activity, 1997-99 Average
Newfoundland and Labrador

	Direct Impact		Total Impact	
Indicator	**Value**	***% of Total Economy***	**Value**	***% of Total Economy***
GDP ($billions)	$1.38	*14.1%*	$2.59	*26.5%*
Labour Income ($billions)	$0.65	*11.6%*	$1.22	*21.8%*
Employment (person years)	24,800	*12.7%*	44,400	*22.6%*

Note: Total impact is the sum of direct, indirect and induced impacts

Labour Income Impact. Direct labour income from oceans-related activity averaged about $650 million from 1997 to 1999 or 11.6 per cent of total labour income. The total labour income impact, including direct, indirect and induced effects, averaged about $1.22 billion over this period, or 21.8 per cent of total labour income in the province. The most significant private sector industries included in this study, in terms of total labour income impact, were the fishery at 8.5 per cent, and offshore oil activity at 5.2 per cent.[2] Total public sector oceans-related activity contributed 3.6 per cent of labour income.

Employment Impact. Direct employment (as measured in person years) from oceans-related activity averaged about 24,800 from 1997 to 1999 or 12.7 per cent of total employment. The total employment impact, including direct, indirect and induced effects, averaged about 44,400 over this period, or 22.6 per cent of total provincial employment. The most significant private sector industries, in terms of total employment impact, were the fishery, at 12.4 per cent, and offshore oil activity, at 3.1 per cent.[2] The relatively low contribution from the oil and gas industry, relative to its GDP and labour income contributions, reflects the capital intensive nature of this industry. Total public sector oceans-related activity contributed 2.4 per cent of employment.

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[2] When using individual industry impacts readers should consult ***Note on Individual Industry Impacts*** on page 12, in Section 1.3.

1.0 INTRODUCTION

1.1 BACKGROUND

The coast of Newfoundland and Labrador is made up of thousands of inlets, coves, and bays with an estimated length of 17,540 km. Of this, the island of Newfoundland's coastline is approximately 9,655 km, and Labrador's is about 7,885 km. Canadian sovereign territory off the Atlantic Coast extends 380 km from the coast of the province, resulting in an ocean area off the province's coastline of approximately 1.1 million sq. km.[3]

Newfoundland and Labrador, including its culture, settlement patterns, and economy, has developed from its association with the ocean. Today, over 90 per cent of the province's population live adjacent to, or within a few kilometres of, the ocean. The increasing utilization of marine, coastal and related resources has increased the need to define, protect and preserve these assets, and to better understand their importance and contribution to the economy.

Two of Newfoundland and Labrador's key industries, oil and gas production and the fishery, are ocean-based. However, the importance of ocean-related activity goes beyond these two industries:

- As an island, marine transportation infrastructure provides a vital link between the province and the rest of Canada, and is necessary to service coastal communities within the Province. To this end, significant public funds are expended by both the federal and provincial governments.

- Marine transportation is also vital for cargo transport and tourism development. Improving port infrastructure at St. John's, Corner Brook, Bull Arm, Marystown and other towns allows local authorities to increase their cargo transport capacities, engage in ocean-based manufacturing and fabrication, attract cruiseships, and open up new economic opportunity. Manufacturers of newsprint, lumber, refined petroleum, and non-resource based goods and services rely on marine transportation to reach export markets. Similarly, tourism promotion and marketing packages often include whale watching, iceberg viewing, sea kayaking, and other ocean-related activity.

- Memorial University of Newfoundland, the Marine Institute, and various other public and private sector research centres are increasingly focused on marine-based environmental, geomatics, communications, and navigational technologies.

The provincial Department of Fisheries and Aquaculture and Fisheries and Oceans Canada wish to determine the economic value of oceans, marine and coastal activity (i.e., the oceans sector) in the province. This report attempts to estimate the importance of the oceans sector to the economy of

[3] Estimated by the Newfoundland Statistics Agency.

Newfoundland and Labrador, building on methodologies previously used for analyses in New Brunswick (2000), Nova Scotia (1998), Australia (1997) and the United Kingdom (1996).

1.2 DEFINING THE OCEANS SECTOR

For the purposes of this study, the area under consideration includes the coastline, inshore and nearshore waters, as well as activity in offshore areas to the edge of the continental shelf.

Marine resources in these areas can be classified as economic or ecological. This study focuses on the oceans sector as an economic resource and includes two broadly based industrial groupings in both the private and public sectors:

- Industries that use/extract ocean resources, including offshore oil production, the fishery, and (to some degree) tourism.

- Industries that use the ocean as a medium of movement, operation or innovation. This would include marine system design and construction, marine operations and shipping, and marine-related equipment and service industries.

Private sector industries considered in the study include:

- oil and gas
- fishery
- aquaculture
- shipbuilding and ship repair
- marine tourism and recreation
- marine transportation and infrastructure (including ports and harbours)
- oceans technologies (marine IT, communications, environmental, biotechnology).

Public sector departments, institutions and agencies include:

Federal[4]

-
- Agriculture and Agri-Foods Canada
- Atlantic Canada Opportunities Agency
- Canadian Environmental Assessment Agency
- Canadian Food Inspection Agency
- Canadian Heritage - Parks Canada
- Canadian Transportation Agency

[4] Other federal departments and agencies have oceans related responsibilities but have no direct operational or labour expenditures in Newfoundland and Labrador and are, therefore, not included in this study.

- Citizenship and Immigration Canada
- Department of Foreign Affairs and International Trade
- Department of National Defence
- Environment Canada
- Fisheries and Oceans Canada
- Human Resources Development Canada
- Industry Canada
- Justice Canada
- Marine Atlantic
- Natural Resources Canada
- National Research Council
- Office of Critical Infrastructure Protection and Emergency Preparedness
- Public Works and Government Services Canada
- Royal Canadian Mounted Police
- Transport Canada

Provincial

- Department of Environment[5]
- Department of Fisheries and Aquaculture
- Department of Human Resources and Employment
- Department of Industry, Trade and Rural Development[6]
- Department of Mines and Energy
- Department of Tourism, Culture and Recreation
- Department of Works, Services and Transportation
- Department of Youth Services and Post Secondary Education[7]
- Memorial University of Newfoundland

Federal-Provincial Partnerships

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[5] Includes activities of the former Department of Environment and Labour.

[6] Includes activities of the former Departments of Industry, Trade and Technology and Development and Rural Renewal.

[7] Includes activities of the former Department of Education.

Research and Development institutes[8]

- Aquanet
- Canadian Centre For Fisheries Innovation
- Canadian Centre For Marine Communications
- C-CORE
- Centre for Aquaculture and Seafood Development
- Centre for Earth Resources Research
- Fisheries Technology Unit
- GENESIS Group
- Ocean Engineering Research Centre
- Oceans Sciences Centre.

1.3 METHODOLOGY

The analytical phase of the study encompassed two key blocks: data collection and economic impact analysis. The initial phase of data collection concentrated on the identification of the private sector industries and government departments/agencies that make up the oceans sector in Newfoundland and Labrador. Every effort was made to include significant and quantifiable data from both the private and public sectors. A list of entities included was outlined in Section 1.2 - Defining the Oceans Sector.

The reference period for the study was 1997 to 1999. The data for the three years were adjusted to remove double counting, and was averaged to help minimize the problems of fluctuations in oceans-related activity over the period. Key data collected for the private sector industries included Gross Domestic Product, labour income and employment. This data came from various sources outlined in Appendix 3. Public sector data came from department labour income and employment (in full-year equivalents) and is contained in Appendix 1.

Fisheries and Oceans Canada managed the collection of federal departmental and agency data. Twenty –seven federal departments and agencies deemed to have oceans-related responsibilities were contacted via letter and asked to contribute to the project. Twenty-one of these responded with information pertaining to total departmental/agency expenditures, income expenditures and number of full time equivalent positions pertaining to fiscal years 1996/97 to 1998/99. The remaining departments/agencies indicated that they had no direct expenditures related to ocean activity in Newfoundland and Labrador or that the expenditures were minimal.

The Department of Finance coordinated and managed the collection of data from seven provincial departments and Memorial University of Newfoundland. It should be noted that a number of federal

[8] Each of these institutes is affiliated with Memorial University.

and provincial departments cautioned that their internal reporting mechanisms were not set up to reply to a request of this nature and that the data should be treated as estimates and considered conservative in most cases.

The study also included cost-shared economic development agreements whose program delivery often includes several federal (e.g., Fisheries and Oceans Canada, Atlantic Canada Opportunities Agency) and provincial (e.g., Industry, Trade and Rural Development; Fisheries and Aquaculture; Tourism, Culture and Recreation) departments. For simplicity, expenditures made through these agreements are, unless otherwise indicated, included with the Atlantic Canada Opportunities Agency and Industry, Trade and Rural Development expenditures.

The provincial Department of Finance also managed the collection of private sector data. A number of sources were used to find, and in some cases, derive the data. A list of sources for private sector data is contained in Appendix 3. Although the goal of the study was to be as comprehensive as possible, not all industries or sub-industries are included due to lack of data. As such, the study's results should be considered conservative.

While recognising that oceans technologies, research and development (R&D) institutes, and industry associations (e.g., Newfoundland Ocean Industries Association, Newfoundland Association of Technical Industries) are a component of the oceans sector, for the purposes of this study these entities were not included as a direct data source as these activities are, in most cases, captured in the indirect impacts.

The economic impacts of the public and private entities identified in this study are separated into three categories:

- Direct impacts are labour income and business profits earned by workers and business owners working directly on a given activity or project;
- Indirect impacts are generated when other firms supply goods and services to the direct activity or project; and
- Induced impacts are generated when direct and indirect employees and business owners spend their incomes on other areas of the economy which leads to increased retail sales, housing starts and so on.

The primary data formed the direct economic impact of the oceans sector. Two economic analysis tools, the Newfoundland and Labrador Econometric and Input-Output Models, were then used to determine the indirect and induced impacts of the oceans sector.

The **Newfoundland and Labrador Econometric Model (NALEM),** is a detailed model of the relationships between key economic variables in the provincial economy and is used by government for economic forecasting as well as to assess the macroeconomic impacts created by major development projects and government policy changes. NALEM contains over 370 mathematical equations and 600 data series which are designed to represent key aspects of the provincial economy,

and to capture the relationship between certain socioeconomic variables or indicators. For example, changes in consumer spending can affect government revenues, employment levels, investment spending, and so on; NALEM tries to capture these relationships. The model is designed to capture the major economic relationships in the provincial economy, but not the minute details of every aspect of economic activity. It provides a representation of the current structure (i.e., basic economic relationships) of the provincial economy. As this structure changes (e.g., EI program changes, tax harmonization, collapse of the groundfishery, development of the oil and gas industry, etc.), the model is m[illegible]fied to capture the new or changed economic relationships. NALEM is organized into 10 diffe[illegible]t sectors. Consumer spending, residential construction, business investment, government spending, exports, and imports comprise the six expenditure sectors essential to the determination of GDP and other key economic indicators. The remaining four sectors cover income and output, demographic and labour market activity, prices and wages, and government revenue. The government revenue sector deals with the revenues of all levels of government. Forecasts can be produced for all main indicators of provincial economic activity including GDP, personal income, labour force, employment, and Consumer Price Index (CPI). Forecasts for detailed components and determinants of the main economic indicators are also available. Forecasts of economic indicators which are largely determined by factors outside of the provincial economy (e.g., interest rates, exchange rates, certain commodity prices, etc.) are generally obtained from external sources such as national forecasting agencies. NALEM has been in use since 1990.

The **Newfoundland and Labrador Input-Output Model (NALIOM),** simulates the relationships between commodity outputs and commodity inputs at an industry level under the assumption of linearity (that is, that inputs used by an industry in the past to produce a commodity will be used in the same proportions in future for producing any incremental output). NALIOM can provide estimates of GDP and employment impacts of over 600 types of commodity purchases on over 200 industries (i.e., the direct impact). It can also provide the impacts of purchases locally sourced to specific industries (i.e., the indirect impact). The model's strength lies in its ability to capture backward linkages that arise from the production of one industry's inputs by other industries, and, in turn, the production of inputs for those industries by their suppliers.

Multipliers from NALIOM were used in this study to obtain the indirect industry impacts, which are the impacts of oceans-related activities on the industries that supply the direct industries with inputs. NALEM was used to capture the induced impacts on the provincial economy, which includes impacts related to the spending of workers who are directly or indirectly employed in oceans-related activity.

[illegible] on Individual Industry Impacts

[illegible]ome cases direct oceans related industries are also indirect (e.g., transportation services used by the oil and gas industry). To avoid double counting, the indirect multipliers have been adjusted to remove any direct impacts quantified elsewhere. As such, readers are cautioned that individual industry impacts in this report are lower in some cases than if an impact was conducted for an industry on a stand alone basis.

1.4 RELEVANCE OF THIS STUDY

Economic value can be derived from ocean resources, and from use of the ocean as a means of movement, operation, business activity (e.g., tourism), and innovation (e.g., engineering, shipbuilding, shipping, research and development). Estimating this value is important for several reasons:

- Fisheries and Oceans Canada can incorporate the analysis and results into policies and management decisions as part of its oceans mandate and development of its oceans strategy;
- It can assist the Atlantic Canada Opportunities Agency in facilitating economic development and building on identified oceans-related opportunities;
- The Government of Newfoundland and Labrador can utilize the results to further its transportation, economic development, and information technology agendas as well as assisting in the development of integrated coastal zone management plans;
- Both orders of government will better understand the role and importance of industries and other stakeholders vis-à-vis their economic contributions in the oceans sector;
- The study will provide baseline and benchmark data from which future trends and growth can be measured, and from which statistics and other information to develop policy can be derived; and
- It will allow for interprovincial analysis with other Atlantic provinces which have completed or are undertaking similar research.

Section Two of this study is an overview of Newfoundland and Labrador's economy. Sections Three to Five provide a qualitative descriptive overview of oceans-related industries and activities. Section Six includes a quantitative analysis of the economic value of the oceans sector in the province. The Appendices include data tables and data sources.

2.0 OVERVIEW OF THE PROVINCIAL ECONOMY

In 1999, Newfoundland and Labrador's economy produced output (measured as Gross Domestic Product or GDP at market prices[9]) of about $12.1 billion before deflating for inflation. This represented growth of 15.2 per cent from $10.5 billion in 1997.[10] This expansion was due to major capital investment projects, and economic restructuring and diversification. Exports, in particular crude oil, were a main factor in this expansion.

The province's output per person relative to Canada as a whole has improved in recent years due to this sustained period of strong economic growth. Real GDP (discounted for inflation) per person for Newfoundland and Labrador was 68.8 per cent of the Canadian average in 1999, up from 64.5 per cent in 1997.[11]

2.1 GOODS SECTOR

The Goods sector accounted for 27 per cent of GDP (nominal terms) in 1997. In terms of employment, this sector accounted for 22.9 per cent of total employment in 1997 and 23.5 per cent in 1999. While oceans-related activity takes place in most Goods industries, it is concentrated in crude petroleum, fish harvesting, and fish processing.

This sector is the main producer of exports. Most production stems from natural resources and is sold in foreign markets. However, economic diversification is allowing for increased interprovincial and international exports of non-resource manufactured goods.

GDP at Factor Cost
Goods Sector Industries, 1997

Industry	GDP ($ millions)	% of Total Economy
Primary	$756	8.4
Fishing & Trapping	*$174*	*1.9*
Crude Petroleum	*$22*	*0.2*
Other primary	*$560*	*6.3*
Manufacturing	$677	7.5
Fish Products	*$135*	*1.5*
Other manufacturing	*$542*	*6.0*
Construction	$555	6.2
Utilities	$455	5
Total	**$2,443**	**27.1**

Note: Data presented is in nominal terms for 1997 only.
Source: Calculated from Statistics Canada

[9] GDP at market prices measures payments to the owners of factor inputs used in production and includes indirect taxes and subsidies. This differs from GDP at factor cost which excludes indirect taxes and subsidies.

[10] Nominal GDP, not adjusted for inflation, was $14.1 billion in 2000. This is 13.8 per cent higher than output in 1999 and 33.2 per cent higher than 1997.

[11] The projected comparative percentage for 2000 is about 70 per cent.

Offshore oil is the highest valued commodity produced in Newfoundland and Labrador. The Hibernia field, which started producing in 1997, extracted 36.4 million barrels of oil in 1999 with an estimated market value of approximately $1 billion.[12] A Development Application on the Terra Nova field was approved in 1997 and the construction phase for the project commenced in 1998. The White Rose project is currently in the planning stages with production scheduled to come on stream in 2005.

The fishery has played a fundamental role in the province's economic development. Problems with historically dominant groundfish stocks in the early 1990s, however, resulted in moratoria on many of these stocks. Since then, the fishery has restructured and diversified. Shellfish now dominates the industry, particularly shrimp and crab. In 1999, about 270,000 tonnes of fish were landed, valued at $505.8 million. This was an increase from a landed volume of 204,400 tonnes and a landed value of $306.6 million in 1997.[13]

GDP at Factor Cost
Services Sector Industries, 1997

Industry	GDP ($ millions)	*% of Total Economy*
Transportation/Storage	$467	5.2
Communications	$313	3.5
Wholesale/Retail Trade	$979	10.9
Finance, Insurance and Real Estate	$1,477	16.4
Community, Business and Personal Services	$2,438	27
Public Administration	$903	10
Total	$6,578	72.9

Note: Data presented is in nominal terms for 1997 only.
Source: Calculated from Statistics Canada

2.2 SERVICES SECTOR

The Services sector accounted for almost 73 per cent of GDP in 1997. It also accounted for 77.1 per cent of employment in 1997 and 76.5 per cent in 1999. Most of the services provided by this sector are consumed within the province, however, exports have been increasing in areas such as tourism, education, and information technology.

Retail and wholesale trade represent the largest private sector employers in the services sector, employing just over 34,000 on average between 1997 and 1999. The value of retail sales has increased considerably in recent years aided by rising personal income and consumer confidence. In 1999, sales reached $4.2 billion, up from $3.8 billion in 1997.[14]

[12] Production in 2000 was 52.8 million barrels.

[13] In 2000, landings were about 275,000 tonnes, with a landed value of $581 million.

[14] The value of retail sales was a record $4.52 billion in 2000. Employment was 37,000.

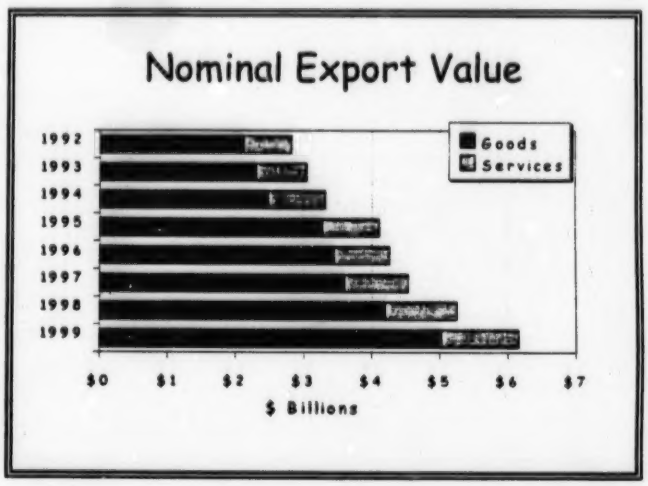
Tourism is a growing services industry driven by the success of special events celebrations (e.g., Cabot 500), increased cruiseship activity, improved infrastructure and more product offerings. Tourism expenditures (resident and non-resident) totalled over $500 million per year over this period. Spending by non-resident tourists, which generally account for between 40 to 45 per cent of total spending, represents a service export for the province. In 1999, there were 408,500 non-resident visitors to the province.[15]

The provision of public services is a major employment generator in the services sector. In 1997, public services accounted for employment of 55,900, or 38.3 per cent of service employment (29.5 per cent of total employment). This includes those who work for a local, provincial or federal government, for a government service or agency, a crown corporation, or a government funded establishment (e.g., schools, universities, and hospitals). In 1999, public employment was estimated at 60,300 or 38.5 per cent of service employment (29.4 per cent of total employment).[16]

Employment in other service industries has been boosted by private sector expansion and diversification including new activities such as customer call centres, oceans technologies and offshore engineering.

2.3 EXPORTS

Exports from the province were valued at just over $6.1 billion in 1999, up from about $4.6 billion in 1997.[17] Goods accoun[illegible] roughly 80 per cent of exports and services for the remaining 20 per cent.



Crude oil and refined petroleum products, fish pr[illegible]cts, newsprint, iron ore and electricity account for the bulk of exported goods. Even though services represent a small portion of exports, their value has been rising due to growth in industries such as tourism, communication, business and computer services.

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[15] Includes air, auto and cruiseship visitors. In 2000, there were 426,250 non-resident visitors to the province.

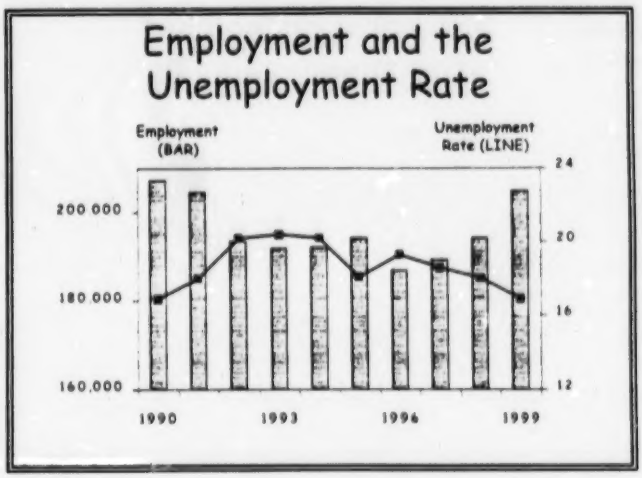
[16] Public sector employment in 2000 was 58,800, or 36.8 per cent of Services sector employment and 28.7 per cent of total employment.

[17] Exports in 2000 were valued at about $8.2 billion.

The value of manufactured shipments totalled just over $2 billion in 1999, most of which is bound for export markets. While natural resources and oil refining dominate the industry, diversification of the manufacturing base continues with the goal of achieving a greater product mix for export and domestic consumption.[18]

2.4 EMPLOYMENT

Employment in 1999 was the highest since 1990 at 204,900.[19] This was a gain of 8.2 per cent from 189,300 in 1997. The unemployment rate declined as employment grew in the latter half of the 1990s. The rate was 16.9 per cent in 1999, down from 18.6 per cent in 1997.[20] Labour markets had endured a difficult period in the 1990s due to problems in the fishery, a global recession, and government restraint at all levels. The hardest hit areas during this period were the more rural regions outside of the St. John's metropolitan area.



[18] Shipment value in 2000 was $2.2 billion.

[19] Employment in 2000 was 204,600 which was relatively stable with 1999.

[20] The unemployment rate fell in 2000 to 16.7 per cent.

3.0 OCEANS-RELATED ACTIVITY: THE PRIVATE SECTOR [21]

3.1 OIL AND GAS

Since offshore exploration activity started in 1966, over 200 wells have been drilled in the offshore Newfoundland and Labrador area, and about 1.2 million square km. of seismic data have been collected. There have been 23 significant discoveries, comprising 2.1 billion barrels of oil and 9.3 trillion cubic feet of natural gas liquids. Industry expenditures from 1966 to 2000 totalled $13.6 billion in exploration ($4.3 billion), development ($8.3 billion), and production ($1.0 billion).

Over the 1997 to 1999 period, the oil and gas industry contributed substantially to the economy through exploration, development and production. Over these three years, 14 exploration/delineation wells were drilled offshore Newfoundland and Labrador and offshore oil exploration expenditures totalled over $400 million. Exploration activity provided approximately 280 person-years of direct employment annually over this period with an associated labour income of $15.5 million per year.

During the study period, development work on Hibernia was completed (1997) and construction on the second oil field to be developed—Terra Nova—began (1998). Offshore oil development activities are estimated to have contributed close to 900 person-years of employment and $50 million in labour income on average over the 1997 to 1999 period. Development activities directly created about $150 million of GDP annually in Newfoundland and Labrador.

Oil Industry Statistics			
	1997	**1998**	**1999**
Exploration Expenditures ($ millions)	75	67	264
Development Expenditures ($ millions)	639	536	923
Oil Production (millions of barrels)	1.3	23.8	36.4
Source: Canada-Newfoundland Offshore Petroleum Board			

Offshore oil production started in November 1997 when Hibernia began pumping oil. This field, which has estimated reserves of 884 million barrels, produced about 62 million barrels by the end of 1999. On average, about 650 persons were employed annually in offshore oil production in the province from 1997 to 1999 and labour income averaged almost $35 million per year. This industry has grown significantly since production started in 1997. Oil and gas production related GDP grew from about $22 million in 1997 to $678 million in 1999.

[21] Key industry data for these industries are included in Appendix 2.

Oil and gas activity represents a growth area with considerable upside potential for the economy in general and for the oceans sector in particular. After some delays, production at Terra Nova began in early 2002 and should average about 130,000 barrels of oil per day at capacity. In addition, the development of White Rose, the third field to be developed, will contribute significantly to the economy.

The development of this industry has resulted in new onshore infrastructure in this province worth $1.2 billion.[22] Construction facilities include Bull Arm (a world class construction facility built for Hibernia construction and subsequently used for Terra Nova construction in the late 1990s), and shipyards and related facilities at Marystown and St. John's. Over 200 local firms supply goods and support services to the industry. Labour force development and expertise in the building and construction trades, engineering, offshore safety, and oil rig trades (e.g., well-head drilling) are benefitting local residents and providing employment.[23]

Growth in this industry is driven by strong Canadian and United States energy markets. This industry is expected to expand and diversify over the next several years, facilitated by:

- The extension of offshore exploration activity into the Flemish Pass, Carson-Bonnition and South Whale Basins, South Coast of the Island, and Western Newfoundland;
- Joint industry-government work into natural gas development;
- The emergence of technology transfer opportunities—front end engineering design; increased local participation in seismic survey mapping; and
- Increased participation in supply and support services aided by improving construction and port/supply infrastructure.

Canada-Newfoundland Offshore Petroleum Board.[24] Activity in the offshore oil and gas industry is managed by the Canada-Newfoundland Offshore Petroleum Board[25]. This joint federal-provincial authority, established in 1985, administers the relevant provisions of the *Canada-Newfoundland Atlantic Accord Implementation Act* and the *Canada - Newfoundland Atlantic Accord Implementation Newfoundland Act*. The Board's regulatory responsibilities include:

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[22] Estimated by the Department of Mines and Energy (2001).

[23] The Whiffen Head Transshipment facility is included in Section 3.6, Marine Transportation. Research and development in support of offshore activity is included in Section 5.4, Memorial University of Newfoundland.

[24] Note that the Canada-Newfoundland Offshore Petroleum Board is a federal-provincial partnership and not a private sector entity. It is included with this section, however, as it is the regulatory body for the offshore oil and gas industry.

[25] While the CNOPB is formally funded on a 50:50 basis by the federal and provincial governments, it also receives licensing and related fees from industry. During the study period, the CNOPB indicated that industry revenues accounted for about 50% of its total revenues.

- the sale of interest in lands;
- the issuance of exploration licences, approvals and authorizations pertaining to exploration activities;
- the declaration of significant and commercial discoveries;
- the issuance of production licences;
- decisions related to the commencement, continuation and suspension of drilling and production;
- the administration of regulations; and
- the exercise of emergency powers pertaining to safety, environmental protection and resource conservation.

In addition to its regulatory role, the Board has the responsibility and authority to evaluate and approve a proponent's industrial benefits plan. In this role, the Board must be assured that the provisions of the *Atlantic Accord Acts* are respected as they relate to providing full and fair opportunities to workers and companies in Canada, and in particular Newfoundland and Labrador, for the supply of goods and services used in offshore activity. The Board employs about 45 people and expends approximately $4.2 million annually.

3.2 FISHERY

Over the past century, the Newfoundland and Labrador fishing industry has transformed from a predominantly salt cod trade to a freshly frozen multispecies industry. This transformation was driven by the introduction of new technologies in the harvesting sector, and by the construction of larger, technology-driven facilities in the processing sector. Fisheries development focussed on groundfish until 1992 when a fishing moratorium was called on the Northern cod stock. Moratoria on other groundfish stocks were announced over the next two years.

In response to these moratoria, the fishing industry has undergone restructuring. This restructuring, involving a substantial reorientation primarily into shellfish species such as crab and shrimp, has positively contributed in recent years to the overall performance of the Newfoundland and Labrador economy. In 1990, crab and shrimp accounted for 13 per cent of total landed value ($34 million of $258 million). By 1999, these two fisheries accounted for 70 per cent of total landed value ($354 million of $506 million). This shift into shellfish has also meant that the fishery has become relatively more capital intensive and less labour intensive. Total fisheries employment (measured in person years) peaked in 1987 at just about 26,000 and, in 1990, stood at 20,900. In 1999, employment stood at 17,100.[26]

[26] Shrimp and crab accounted for 75% of landed value in 2000. Fisheries employment in 2000 averaged 15,200.

Fishing Industry Statistics			
	1997	**1998**	**1999**
Volume of Landings (metric tonnes)	206,026	251,100	270,620
Value of Landings ($ millions)	308.8	363.9	505.8
Employment (person years)			
Harvesting	8,500	9,600	8,700
Processing	5,300	6,100	8,400
Total	13,800	15,700	17,100

Source: Department of Fisheries and Aquaculture; Statistics Canada; provincial Department of Finance

Note: These data only include the portion of offshore shrimp landings that accrue to Newfoundland-based licences and, hence, they tend to be lower than published DFO data.

Crab. Crab landings grew throughout the 1990s and peaked in 1999 at about 69,200 tonnes. The landed value of this fishery also grew to $236.3 million by 1999.[27] About 3,400 inshore fishing enterprises and 35 processing plants participate in this fishery. During peak season, about 17,000 people are employed in this fishery in harvesting and processing.

Northern Shrimp. In 1997, 39,000 tonnes of shrimp was landed in Newfoundland and Labrador. By 1999 about 69,000 tonnes, valued at about $154 million, was landed.[28] About one-half of this latter amount was landed by a relatively new (since 1996) fleet of 360 nearshore temporary shrimp permit holders. During peak season, about 3,000 people are employed in this fishery in harvesting and processing.

Groundfish. Despite experiencing a very severe blow in the early 1990s, groundfish activity rose over the study period from 36,000 tonnes (valued at $31 million) in 1997 to 68,000 tonnes ($85 million) in 1999. Of this, cod comprised 12,000 tonnes ($11 million) in 1997 rising to 37,000 tonnes ($62 million) in 1999. From 1987 to 1991 (i.e., pre-moratoria), landings of groundfish averaged about 350,000 tonnes (including 250,000 tonnes of cod).

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[27] Landings declined to about 56,000 tonnes ($263 million) in 2000.

[28] Landings grew to 77,400 tonnes ($179 million) in 2000.

3.3 AQUACULTURE

In 1995, aquaculture production exceeded 1,000 tonnes for the first time, and in 1996, aquaculture sales exceeded $5 million for the first time. By 1999, production totalled 4,308 tonnes at a sales value of about $18.3 million[29]. Aquaculture operators employed about 500 people annually over this period.[30] The four main species produced in Newfoundland and Labrador are blue mussels, Atlantic salmon, steelhead trout, and cod.

Aquaculture Production (metric tonnes)			
	1997	**1998**	**1999**
Atlantic Salmon	613	401	399
Trout	369	1,364	2,088
Cod	26	36	105
Mussels	752	946	1,700
Other	17	7	16
TOTAL	**1,777**	**2,754**	**4,308**
Source: Department of Fisheries and Aquaculture			

3.4 SHIPBUILDING AND SHIP REPAIR

Shipbuilding is an integral part of marine manufacturing in the province. Anchored by large modern facilities at St. John's and Marystown, local shipyards have the capability to construct and repair medium size, technologically advanced ships, as well as oil rigs and subsea equipment. In recent years, the industry has also engaged in national and international procurement, thereby creating new employment and technology transfer opportunities. Employment in shipbuilding is estimated at about 1,000 persons in 1998—this fell to about 562 in 1999.

These shipbuilding facilities are supplemented by an experienced and strategically placed network of smaller manufacturers and marine service centres (e.g., Harbour Grace, Port Saunders, Bonavista, L'Anse au Diable). According to Statistics Canada, seven firms were engaged in boatbuilding

[29] Weak markets limited production in 2000. Total sales declined by $4 million and total production dropped by 1,500 tonnes.

[30] This translates into about 250 person years of employment as jobs are not full-year.

activity, employing approximately 75 people in 1998. Most firms service the fishing fleet, however, some are also engaged in the manufacture and repair of recreational craft.

3.5 MARINE TOURISM AND RECREATION

The tourism industry grew significantly over the period from 1997 to 1999 driven by the special celebrations strategy (e.g., Soiree'99)[31] and increased cruise ship visitation. Tourism growth was also aided by more diversified product offerings (e.g., golf, archaeology), improved transportation and accommodations infrastructure, and increased business travel resulting from improved economic performance. A weak Canadian currency versus the US dollar also assisted in making the province more attractive to US tourists in recent years. Between 1997 and 1999, non-resident visitation grew by almost 12 per cent (associated expenditures increased by about 14 per cent).[32]

Both resident and non-resident tourists travel for a number of reasons, including business, pleasure (hunting, fishing, hiking, sightseeing), and visiting family and friends. An estimated five per cent of resident tourists, 47 per cent of non-resident auto tourists and 36 per cent of non-resident air tourist participate in oceans/marine related activities.[33] Using this information, it is estimated that over 1,200 person-years of employment can be attributed to oceans/marine related tourism. Associated labour income is approximately $23 million.

The Cruiseship Authority of Newfoundland and Labrador (CANAL), legislatively incorporated in 1998, promotes and co-ordinates industry activity. CANAL is promoting the province as a unique and distinctive destination for Adventure/Ecotourism, South/North and Trans-Atlantic cruises and for home porting cruises within the Province. In 1999, 60 cruise ship port calls were registered and 22,500 passenger visits. The overall economic impact from cruise ship activity in the province in

[31] This was followed by the Vikings! 1000 Years celebrations in 2000.

[32] In 2000, non-resident visitors reached a high 426,250 and expenditures totalled $290 million.

[33] See Appendix 3 for further details on this data source.

1999 was about $2 million. Given the developing nature of this industry, these figures are expected to grow over the foreseeable future. [4]

3.6 MARINE TRANSPORTATION AND INFRASTRUCTURE

Marine transportation encompasses a wide range of services related to water transportation. It includes the transportation of freight, operation of ferries, the provision of stevedoring and other marine cargo handling services, the operation of harbour and port facilities and services, the provision of harbour navigation services as well as other services related to marine transport.

Ferries. The operation of ferries between Newfoundland and Nova Scotia by Marine Atlantic and intraprovincial ferry services comprise a substantial portion of the marine transportation industry. (See Sections 4.3 and 5.3.)

Marine Transportation Statistics			
	1997	**1998**	**1999**
Total Employment (person years)	2,600	2,800	2,800
Marine Atlantic	555	444	456
Coastal Ferries	195	225	225
St. John's Port	16	15	15
Whiffen Head Transshipment Facility	0	20	47
Total Labour Income ($ millions)	86	93	99
Source: Statistics Canada; provincial Department of Finance			

Marine Cargo Shipments. The amount of cargo handled at major ports has increased significantly in recent years, driven by the production and movement of oil, demand for supply services by the offshore oil industry, exports by manufacturers, and imports of finished consumer goods fuelled by a growing economy. In 1996, about 11 million tonnes of cargo was handled. By 1999, this grew to 22.4 million tonnes driven by crude oil shipments from Hibernia (beginning in November 1997).

Four locations, all of which are involved in the movement of oil, accounted for over 82 percent of total shipments in 1999. Come by Chance handled the most cargo, followed by the Hibernia oil

[34] In 2000, there were 66 cruise ship port calls but fewer passenger visits, about 15,000. The decline in the number of passenger visits reflected the increased use of smaller cruise vessels.

field[35], Whiffen Head and Holyrood. Because of the large volumes of oil transferred at the other ports, cargo movements in Corner Brook and St. John's appear relatively small. However these two are major ports for the shipment of consumer and other industrial goods. A large portion of Corner Brook's cargo is newsprint while St. John's is the main point of entry for consumer goods.

Ports and Harbours. Ports are administered by a Canada Port Authority, private sector firms, volunteer boards, or the federal and provincial governments. The St. John's Port Authority is the only Canada Port Authority in the province. This means that the St. John's Authority is an autonomous federal Crown agency that falls under the ambit of the *Canada Marine Act*. The St. John's Port Authority estimates that the port generates $180 million in revenues per year and creates 2,500 direct and spin-off jobs. These revenues are derived from several sources: cargo transport; supply services to the offshore oil industry; cruiseship activity; fishing;

Cargo Handled by Port, 1999

Port	Millions of Tonnes			Per Cent of Total Province
	Inter-national	Domestic	Total Port	
Major Ports Handling Oil				
Come By Chance	8.38	0.24	8.62	38.4%
Whiffen Head	2.37	2.32	4.69	20.9%
Hibernia	2.16	2.44	4.60	20.5%
Holyrood	0.47	0.16	0.63	2.8%
Other Major Ports				
Corner Brook	0.97	0.31	1.28	5.7%
St. John's	0.03	0.91	0.94	4.2%
Stephenville	0.22	0.06	0.28	1.2%
Botwood	0.13	0.10	0.23	1.0%
Port aux Basques	0.00	0.16	0.16	0.8%
Argentia	0.08	<0.01	0.09	0.5%
Goose Bay	<0.01	0.04	0.05	0.2%
Other	0.08	0.8	0.88	3.9%
TOTAL	14.89	7.53	22.42	100.0%

Notes: This data includes both cargo loaded (port of origin) and unloaded (port of destination). As such, some product, such as oil at Come by Chance and Whiffen Head is counted twice (upon arrival and upon departure). As well, Statistics Canada officials indicate that there may be some undercounting of cargo shipments at Goose Bay.

International shipments include cargo arriving from and going to international destinations. Domestic refers to shipments to and from other Canadian ports (including within Newfoundland and Labrador).

Source: Statistics Canada, provincial Department of Finance.

[35] See Appendix 3 for further details on this data source.

tour boats; and infrastructure improvements which are allowing the Port Authority to attract other business.

The administrative role of private sector firms and volunteer boards in harbour management is increasing. Beginning in 1995, Transport Canada, under its National Marine Policy, has been devolving responsibility for administration of most ports to local authorities. Exclusions to this policy included those eligible for Canada Port Authority status and those designated as remote ports which will continue to be federally operated. In this province, six ports were divested to the private sector, 31 ports were divested to the provincial government, and 20 ports remain eligible for divestiture.

Over the same period, Fisheries and Oceans Canada has been implementing several initiatives through its Small Craft Harbours program which are markedly increasing the role of the voluntary sector in harbour management. Harbour Authorities are being established at active fishing harbours, while inactive fishing harbours and recreational harbours are being divested either through transfer to not-for-profit organizations or facility removal. Harbour Authorities are typically non-profit, locally controlled organizations with strong links to the fishery. These Authorities, through lease agreements, manage wharf and docking facilities, provide services, and generate revenue to cover the costs of day-to-day management and minor maintenance. The Department continues to be the custodian of the property while playing a monitoring and advisory role to Authorities and providing funding for major repairs, maintenance and capital requirements. In Newfoundland and Labrador, of 409 small craft harbours, 197 harbours are currently being managed by Harbour Authorities, 81 have been identified as potential harbour authority managed sites, and 19 have been divested or are in various stages of the divestiture process. It remains to be decided if the remaining 112 harbours will come under Harbour Authority management (for fishing harbours) or be divested to other organizations.

3.7 OCEANS TECHNOLOGIES

Oceans technologies (except biotechnology) typically focus on low volume, high value custom engineered products and services for use in, on and/or beneath the ocean. The oceans technology industry in the province is growing, aided by oil and gas development, fisheries expansion, and by a general maturing of information industries. Firms in the local industry are engaged in hydrographic services, remote sensing, marine communications, custom engineering and product development, marine geomatics, electronic charts and mapping, marine training, weather forecasting, defence surveillance, ice management, and/or environmental technologies.

Most firms are small (less than 50 employees), entrepreneurial, export oriented, and have advanced technical capabilities in R&D, manufacturing and/or marketing applications. There are about 50 companies operating in this province, employing about 1,000 workers. Many firms have entered into joint venture and partnership arrangements with larger, out-of-province firms for technology transfer, procurement, and marketing purposes. Firms are supported by indus organizations, such as the Newfoundland Oceans Industries Association and Newfoundland Association of Technical Industries. Total revenues to local firms are about $45 million annually (including publicly funded R&D grants

and subsidies). Most local firms sell products and services to local industry (e.g., oil, the fishery) and, as such, their economic contribution is considered an indirect impact from other industries.

The biotechnology industry is emerging as a new industry in the province, primarily focusing on marine applications. In 1999, the industry had revenues of approximately $2 million, and R&D spending exceeded $3.5 million (see Section 5.5). There are about 15 biotechnology companies in the province, employing about 100 people. An additional 400 people are employed in academic R&D.

4.0 OCEANS-RELATED ACTIVITY: FEDERAL PUBLIC SECTOR [36]

Canada's oceans are part of the "global commons" and, therefore, the management premise of Canada's oceans is based on both national and international obligations and commitments. In Newfoundland and Labrador, 22 federal departments and agencies administer these commitments and obligations, generating about 2,500 person years of employment. While some departments and agencies have greater presence than others, collectively their specific authorities, policies and program responsibilities guide a wide range of activities: resource management; sovereignty and defence; economic, trade and industrial development; transportation and safety; and health and environment.

4.1 FISHERIES AND OCEANS CANADA

Fisheries and Oceans Canada (DFO) is responsible for policies and programs in support of Canada's economic, ecological and scientific interests in oceans and inland waters; for the conservation and sustainable utilization of Canada's fisheries resources in marine and inland waters; for leading and facilitating federal policies and programs on oceans; and for safe, effective, and environmentally sound marine services responsive to the needs of Canadians in a global economy.

With approximately 1,200 full-time employees, DFO has the largest federal presence in Newfoundland and Labrador and is the only department with virtually its entire budget and staffing devoted to ocean-related activities. Programs and services for the public are delivered through several branches.

The **Fisheries Management Branch** is responsible for the management, conservation and protection of marine and inland fisheries. In addition to developing and enforcing annual harvesting plans for 40 different fish species, the harvesting and processing of which generates an export value of roughly $1 billion, the Branch is also responsible for addressing international issues, such as trans-boundary stocks managed through the Northwest Atlantic Fishery Organization (NAFO).

The **Canadian Coast Guard (CCG)** ensures the safe and environmentally responsible use of Canada's waters; supports the understanding and management of oceans resources; facilitates the use of our waters for shipping, recreation and fishing; and provides marine expertise in support of Canada's domestic and international interests. The CCG undertakes programs and activities to achieve its long-term objectives. The major program areas include marine safety, service and environmental protection, environmental response, boating safety, icebreaking, marine communications and traffic services, navigational aids, protection of the public right to navigation, and fleet support to fisheries enforcement and scientific research.

The **Science, Oceans and Environment Branch** provides timely and reliable scientific information and advice in support of the conservation, protection, and sustainable utilization of marine and aquatic

[36] Federal public service data is included in Appendix 1.

resources in the region. Programs include research activities such as studies of the biology, life history and resource status of commercially important and emerging species and ecosystems, biological and physical oceanography, aquaculture, environmental sciences, habitat protection, and *Oceans Act* implementation. The Branch also contributes to marine safety through its hydrographic division, which produces marine navigation charts.

Through the collection and analysis of a wide variety of data, the **Policy and Economics Branch** provides analytical, economic and policy advice in support of fisheries management and development, and public investment initiatives affecting the fish harvesting, processing and aquaculture sectors.

With a focus on partnering with local Harbour Authorities, the **Small Craft Harbours and Real Property Management Branch** is responsible for long-term maintenance of 409 active fishing harbours in the region.

4.2 ATLANTIC CANADA OPPORTUNITIES AGENCY

The Atlantic Canada Opportunities Agency's (ACOA) oceans related responsibilities and activities stem from its mandate and strategic focuses. Most funding in this area comes from ACOA's Business Development Program, Atlantic Investment Partnership, and through cost-shared federal-provincial agreements. Cost-shared agreements, worth a total of about $345 million[37], include:

- Comprehensive Economic Development Agreement (70:30 federal:provincial cost-sharing ratio, expires March 2005);
- Economic Development Component of the Fisheries Adjustment and Restructuring Initiative (70:30, expires March 2003);
- Agreement on Economic Renewal (80:20, expires March 2002); and
- Strategic Regional Diversification Agreement (70:30, expired June 2001).

ACOA also provides a Consulting Advisory Service to assist business clients. Oceans related industries that have taken advantage of this service include oil and gas, fishing, aquaculture, tourism, boating and shipping, ocean industries and technologies, and marine defence.

4.3 MARINE ATLANTIC

Marine Atlantic is a federal Crown corporation that operates ferries across the Cabot Strait between the island of Newfoundland and mainland Canada. Management functions are located in St. John's (head office), Port aux Basques (finance, accounting, computer systems and risk management) and North Sydney (operations management, human resources, purchasing, marine technical, and safety functions).

[37] Not all monies are directed to oceans-related activities.

Ferries operate year-round on the 100 nautical mile route between Port aux Basques and North Sydney, and during the summer on the 280 nautical mile route between Argentia and North Sydney. The company owns four vessels: the MV *Caribou* (built in 1986, capacity of about 1,000 passengers and 350 autos); the MV *Joseph and Clara Smallwood* (1990, similar capacities as the MV *Caribou*); the MV *Leif Ericson* (purchased in 2000, capacity of 500 passengers and 300 autos); and the MV *Atlantic Freighter* (1978, carries trailers without drivers, containers and dangerous commodities). Marine Atlantic experienced its second consecutive year of record traffic in 1999, carrying about 475,700 passengers.[38]

4.4 ENVIRONMENT CANADA

Environment Canada delivers oceans-related programs through four branches. The Corporate Affairs Branch delivers the EcoAction funding program in the province and has responsibility for the Atlantic Coastal Action Program (two sites in the province). The Environmental Protection Branch enforces the *Canadian Environmental Protection Act* and the *Fisheries Act* (Section 36), and delivers several marine related programs such as the Shellfish Water Quality Protection Program, Ocean Disposal Permit Program, and Environmental Emergencies Program. The Meteorological Service of Canada provides weather warnings and forecasts (including marine forecasts) for the province and surrounding waters, and provides other services including extreme weather and sea state forecasts, monitoring, climatology and research in Atlantic storms. The Environmental Conservation Branch delivers the enforcement and science programs of the Canadian Wildlife Service, and participates in the provision of information and advice for environmental assessments and responses to marine environmental emergencies.

4.5 DEPARTMENT OF NATIONAL DEFENCE

CFS St. John's serves as a support station for many aspects of the Department's operations in support of maritime operations. The most significant activity in this region focuses on HMC ships engaged in patrolling the offshore fishery. An estimated 125 sea days are committed to this task.[39] Coupled with this, St. John's serves as a replenishment, rest and recreation port for approximately 25 port visits by HMC ships per year. In addition, air support services are provided by Gander and Torbay airports for regular maritime patrol flights.

4.6 TRANSPORT CANADA

Transport Canada has two main roles in the oceans sector: marine safety and overseeing the management of ports. Marine Safety encompasses the full spectrum of responsibilities related to the safety of ships, the protection of life and property, and the environment. The Harbours and Ports

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[38] In 2000, passenger traffic reached another record high of 508,970, an increase of 7 percent.

[39] National Defence patrols supplement extensive offshore surveillance conducted by Fisheries and Oceans Canada - Newfoundland Region.

Branch is implementing a divestiture program consistent with the National Marine Policy while continuing to operate sites under its authority. There are presently 20 ports remaining to be divested in the province.[40]

4.7 NATURAL RESOURCES CANADA

This department is responsible for energy resource stewardship, including funding for the Canada-Newfoundland Offshore Petroleum Board; the cost-shared Offshore Development Fund; and the Geological Survey of Canada (GSC).[41] The GSC supplies a national geoscience knowledge base required to support effective mineral and hydrocarbon exploration and development across Canada, provides the geological basis necessary to understand and address health, safety and environmental issues, and advocates the interests of Canadian geoscience at the international level. The Atlantic Office is located in Nova Scotia and is responsible for marine geoscience.

4.8 OTHER DEPARTMENTS AND AGENCIES

Agriculture and Agri-Foods Canada - involvement in the fishing and seafood industry is limited to market development activities. These activities include: one-on-one counseling regarding market development; provision of specific market information; trade leads related to the seafood sector; recruitment for trade shows; providing a Canadian pavilion at major shows; a fax-back information service; and a web site specifically for seafood market development.

Department of Canadian Heritage through **Parks Canada** - responsible for establishing a system of National Marine Conservation Areas that are representative of the country's ocean environments and the Great Lakes. This work is designed to represent the diversity of our nation's marine ecosystems; maintain marine ecological processes and life support systems; preserve biodiversity; serve as 'models' of sustainable utilization of species and ecosystems; facilitate and encourage marine research and ecological monitoring; protect depleted, vulnerable, threatened, or endangered species, populations and habitats; protect and maintain areas critical to the lifecycles of economically important species; and provide interpretation of marine areas for the purposes of conservation, education and tourism. For the purposes of this study, oceans related activity from this Department includes specific oceans related research at the Terra Nova and Gros Morne National Parks. It does not, however include general operations and maintenance activities at these National Parks or any other National Historic Sites in the province.[42]

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[40] Two of these sites are expected to be divested shortly.

[41] Natural Resources Canada provided data for its geological survey of Canada Branch but not for other oceans-related expenditures. Its contributions to the Canada-Newfoundland Offshore Petroleum Board and the Offshore Development Fund are estimates based on provincial expenditures and established cost-sharing ratios.

[42] This methodology differs and takes a narrower view of oceans activity than that of New Brunswick (2000) which included total operations and maintenance expenditures.

Citizenship and Immigration Canada - three main activities that are oceans-related: shipping (monitoring and enforcement), oil and gas (employment authorizations), and tourism (ensuring that individuals meet entrance requirements).

Human Resources Development Canada - is involved in oceans-related activities indirectly through EI income support for many workers in marine related industries and employment programming funded through the EI account.[43]

The EI fund also provides for employment programming through the Labour Market Development Agreement. This programming includes the provision of training seats at post secondary institutes, wage subsidies, self employment assistance and skill upgrading/job creation opportunities. Oceans related data is only available for training seat purchases made at the Marine Institute of Memorial University of Newfoundland. Over the 1997-1999 period, over 1,200 individuals received assistance through this program.

HRDC was also responsible for coordinating most TAGS (The Atlantic Groundfish Strategy) and FRAM (Fisheries Restructuring and Adjustment Measures) activity in the province, including income support, employment adjustment, training and early retirement measures (but excluding certain licence retirement and economic development components). These programs were established by the federal government in response to the groundfish moratoria of the 1990s and were terminated in August 1998.

Industry Canada - reviews industrial benefits plans, monitors contracting for offshore oil and gas projects and identifies supply gaps and opportunities for Canadian participation. The Department, in cooperation with the **Department of Foreign Affairs and International Trade**, also maintains a focus of international business development as it relates to the export of oceans technology products and services.

Justice Canada - provides its clients (i.e., federal government departments and agencies) with a variety of advisory and civil litigation services in connection with clients' oceans-related activity. The Department also prosecutes persons who are accused of violating oceans-related criminal legislation, and is assisted in these functions by private lawyers who are retained as agents of the Minister of Justice.

Public Works and Government Services Canada - provides architectural and engineering services to federal departments and agencies, including construction and project management for wharves, breakwaters and other marine structures, and offices, laboratories and related facilities. Services are generally on a cost recovery basis with the client department. The Department also provides property

[43] EI benefit payments to individuals are not directly included in this study. While benefit payments are not part of direct impacts, they would be partly captured in the induced impacts.

and facilities management, office accommodation and real estate advisory services, and serves, through its Supply and Services Directorate, as the federal government's chief purchasing agent.

Canadian Environmental Assessment Agency - manages and coordinates environmental reviews (panel review and comprehensive study process). During the 1997-1999 period, the Agency completed one panel review in the Newfoundland and Labrador offshore (the Terra Nova Project which was released in 1997) and one comprehensive study process (the Newfoundland Transshipment Terminal in 1996). The Agency recently completed a comprehensive study process for the White Rose Project (2001).

Canadian Food Inspection Agency - responsible for the enforcement of the *Fish Inspection Act*, components of the *Fisheries Act*, and other food related legislation as it pertains to fish as food. Activities include: inspection of fish, fish products, fish processing establishments, water supplies used in fish processing, transport vehicles, fishing vessels and wharves and unloading sites; sampling and analysis of shellfish to ensure compliance with biotoxin and microbiology requirements of the Canadian Shellfish Sanitation Program (CSSP); certification of fish products for export; and licensing of processing establishments for export purposes.

Canadian Transportation Agency - maintains oceans related regulatory responsibilities under the *Coasting Trade Act*, *Pilotage Act* and *Canada Marine Act*.

National Research Council - operates the Institute for Marine Dynamics (IMD). IMD was established in 1985 as a national centre for ocean technology research and development. It provides technical assistance to Canadian businesses and works with international companies and research agencies to bring new technology to Canada.

Office of Critical Infrastructure Protection and Emergency Preparedness - reporting to the Minister of National Defence, this office is responsible for developing and implementing a comprehensive approach to protecting Canada's critical infrastructure from threats and vulnerabilities, and ensuring national civil emergency preparedness. Specifically pertaining to ocean activity in Newfoundland and Labrador, the office administers the Disaster Financial Assistance Arrangements and, consequently, was involved in responses to the January 2001 storm on the South Coast and Hurricane Luis in 1995.

Royal Canadian Mounted Police - monitors pleasure boaters, engages in search and rescue efforts, and enforces coastal fishing and hunting activities under 258 *Acts*. The RCMP also maintains the Force's only Catamaran (PMV *Simmonds*) in Atlantic Canada. Based in Burin, this vessel is used to enforce the *Customs and Excise Act* between Canada and St. Pierre and Miquelon, and, as required, supports enforcement activities carried out by Fisheries and Oceans Canada.

5.0 OCEANS-RELATED ACTIVITY: PROVINCIAL PUBLIC SECTOR [44]

The province's geographical position (as an island in the case of Newfoundland, as an adjacent to the ocean in the case of Labrador) requires that government assume certain roles and responsibilities vis-à-vis oceans management, including transportation, economic development, and environmental monitoring. Seven departments administer these responsibilities within the province, generating close to 500 person years of employment. Additionally, through Memorial University of Newfoundland, there is a concentration of oceans-related research and development expertise within the province.

5.1 DEPARTMENT OF FISHERIES AND AQUACULTURE

The principle responsibilities of the Department of Fisheries and Aquaculture are fisheries and aquaculture development, processing capacity management, and quality enhancement. The Department's mandate is to support and promote the development of sustainable and viable fishing and aquaculture industries, aimed at producing high value and quality products. This is achieved by providing fishing and aquaculture industry participants, other government organizations, and the general public, with programs and services in the areas of fisheries and aquaculture development, quality assurance, processing and aquaculture capacity management, policy development and analysis, and information services.

In recent years, the primary focus of the Department has been to balance processing capacity with available resources; to promote the utilization of emerging fish species; to maximize the value of all fish resources; and to develop the province's aquaculture industry.

The Department administers, and is governed by, seven pieces of legislation. These include the *Aquaculture Act*, *Fisheries Loan Act*, *Fish Inspection Act*, *Fisheries Act*, *Fisheries Restructuring Act*, *Fishery Products International Act* and the *Professional Fish Harvesters Act*.

5.2 DEPARTMENT OF INDUSTRY, TRADE AND RURAL DEVELOPMENT

The Department of Industry, Trade and Rural Development serves as co-chair for economic development agreements with the federal government[45], monitors industrial benefits from offshore oil development projects, supports the development of advanced technologies in the province and administers the functions of the former Fisheries Loan Board.

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[44] Provincial public service data is included in Appendix 1.

[45] Note that these agreements, listed in Section 4.2, include two directed at the fishing industry, and cover a range of other industries (tourism, aquaculture, IT, manufacturing and others). For simplicity in defining and analyzing oceans sector expenditures and to ensure no double counting, the provincial cost-shared component in Appendix 1 is attributed wholly to the Department of Industry, Trade and Rural Development.

The Industrial Benefits Division leads departmental activities relating to industrial benefits activities and government procurement. The division contributes to economic development in the province by concentrating its efforts on major projects in the oil industry, special government procurement initiatives such as the Canadian Search and Rescue Helicopter Project, and other initiatives such as Voisey's Bay development. The Division also jointly administers the Industry Development Fund (IDF) with Natural Resources Canada. This joint Provincial-Federal cost-shared fund is a component of the Offshore Development Fund, which was structured pursuant to the Atlantic Accord. Currently, the IDF focus is mainly on development studies, research, testing, and education support. The Industry Support Division of the Department facilitates and supports development of advanced technology industries (including environmental and marine technologies) in the province. This includes, but is not limited to, funding for industry associations, sector studies, and strategic planning exercises focused on industry growth and development.

The Portfolio Management Division implements the functions of the former Fisheries Loan Board of Newfoundland. This includes collections under the Direct Loan Program (about $20 million outstanding from about 2,000 clients) and loan guarantees under the Fisheries Loan Guarantee Program. This program operates under agreements with chartered banks through which the Department provides a loan guarantee covering about 20 percent of loans granted. The Province has a contingent loan exposure of about $20 million under this program.

5.3 DEPARTMENT OF WORKS, SERVICES AND TRANSPORTATION

This department manages 16 provincial marine ferry services providing passenger and freight services and, when required, implements emergency evacuations. These ferry services include those routes that have historically been provincially operated (e.g., Portugal Cove-Bell Island, Fogo Island-Farewell) as well as those that have been devolved in recent years from the federal government (e.g., Lewisporte-Goose Bay). Many of these routes are directly serviced by the Department while other routes (e.g., St. Barbe-Labrador Straits/Blanc Sablon) are administered through third party contracts.

The Department is also responsible for administering 16 port authorities along the Labrador coast and 15 port authorities along the province's south coast. These authorities were transferred to the Province by Transport Canada as part of marine services agreements in the late 1990s.

5.4 OTHER PROVINCIAL DEPARTMENTS

Department of Environment - administers various *Acts* as they relate to the allocation of water, stream alterations, protection of water supply areas, and other aspects of water resource management. (Most of these activities are freshwater-related; minimal activity is oceans-related.) The Department also participates on national policy development working groups such as the impacts of global climate change, and protection of water resources.

Department of Human Resources and Employment - responsible for implementing fisheries adjustment (early retirement) agreements signed with the federal government during the 1990s. These

agreements include: Plant Workers Adjustment Program (1991, 184 retirees); Northern Cod Early Retirement Program (1993, 1,436 retirees); Atlantic Fishers Early Retirement Program (1995, 252 retirees); Fishplant Older Workers Adjustment Program (1995, 560 retirees); and Fisheries Early Retirement Program (1998, ongoing, estimated at almost 1,400 retirees at maturity).

Department of Mines and Energy - responsible for facilitating and/or undertaking: energy resource stewardship as it relates to offshore oil and other resources; delivery of programs and advisory services supporting resource assessment, management and/or development; and the development, monitoring and evaluation of policy, legislative and regulatory frameworks. These functions are delivered in partnership with energy industry associations and producers; provincial, national and international businesses actively pursuing energy resource assessment and/or development; and those municipal, provincial, federal and federal-provincial departments and organizations which share some aspect of Energy's mandate (e.g., the Canada-Newfoundland Offshore Petroleum Board).

Department of Youth Services and Post-Secondary Education - through the Offshore Development Fund, implements offshore training programs for workers in relevant oil rig and shipping trades. It provides direct funding to the College of the North Atlantic to cover the cost of facilities, equipment and support services for offshore training. Finally, it provides funding for the Atlantic Accord Career Development Awards Program. This Program has provided scholarships and bursaries to almost 6,000 post secondary and graduating high school students since inception.

5.5 MEMORIAL UNIVERSITY OF NEWFOUNDLAND

The Marine Institute of Memorial University of Newfoundland is the successor of the College of Fisheries, Navigation, Marine Engineering and Electronics. Enrolment at the Marine Institute is greater than 4,500 on an annual basis, instructed by 130 faculty members. The role of the Institute is to develop, apply, and transform new technology initiatives to support the offshore oil industry, the fishery and other marine industries. In addition to providing education and training programs, the Institute supports industry through its participation in research and development, technology transfer, and public policy advocacy initiatives. The Institute is also embarking on efforts aimed at increasing the University's status as an innovator and contributor to the understanding, education, and research in the oceans sector.

In addition to the Marine Institute, significant oceans-related research is undertaken at various research institutes and departments at Memorial University. In most cases, these institutes are funded through public sector (federal, provincial and/or cost shared grants) or private sector investments, and have minimal own-source core funding. The larger research and development centres are identified below.

Aquanet. In July 2000, AquaNet was established as one of Canada's Centres of Excellence to undertake aquaculture research. Funded for a four year period by Industry Canada, research at this facility is primarily aimed at increasing the efficiency of aquaculture production through species diversification, biotechnology, and environmental sustainability. In addition, funding is provided for

the training of highly qualified personnel, and to assess environmental and social aspects of the industry.

Canadian Centre for Fisheries Innovation. The Canadian Centre for Fisheries Innovation (CCFI), established in 1989, has a mandate to apply fisheries related science and technology capability to the issues and potential of the fishing industry. In meeting this mandate, the CCFI, in partnership with industry and government, conducts research and development and demonstration projects in harvesting, processing, aquaculture, and marine biotechnology. This work benefits fish harvesters and processors, aquaculture operators, manufacturers of fisheries related equipment, and those responsible for regulating the resource. The CCFI's research and development activities are carried out in partnership with the Marine Institute's Centre for Aquaculture and Seafood Development, Memorial University's Departments of Biology, Chemistry, and Biochemistry, and the Ocean Sciences Centre.

Canadian Centre for Marine Communications. The Canadian Centre for Marine Communications (CCMC), established in 1989, collaborates with the Canadian marine information technology industry to develop products and services in the areas of marine communications, navigation and information technology. Current initiatives within the Centre's program framework include: an extension of the "information highway" to offshore areas; marine geomatics in support of the offshore oil industry; development of enabling technologies and marine applications for satellite communications; marine applications of robotics and intelligent systems; and development of new wireless technologies and applications. These activities are strategically designed to build a prosperous Canadian marine IT sector comprising industry, government and academia.

C-CORE. C-CORE is an applied R&D corporation which specializes in engineering and business skills required by resource industries. Established in 1975, C-CORE activities include technology transfer and demonstration, commercialization of intellectual property and specialized advisory services to a wide range of industries. Within the oceans sector, C-CORE is undertaking major programs in, among other areas, ice engineering and management, fisheries stock assessment techniques, fish processing technologies, natural gas pipelines, remote sensing, and geotechnical engineering. Under the Harsh Environments Initiative of the European and Canadian space agencies, C-CORE is seeking to adapt and apply space technologies to sectors such as oil and gas, which operate in harsh terrestrial and marine environments.

Centre for Aquaculture and Seafood Development. This Centre seeks to enhance the competitiveness of the aquaculture and seafood processing sectors by working with industry in areas of applied research, product and process development, technology transfer and advisory services, and support for education and training activities. Activities and research at this centre include but are not limited to: plant sanitation; process design; product formulation; thermal processing; fish nutrition; water recirculation and treatment; developmental shellfish biology; and aquaculture site selection.

Centre for Earth Resources Research. The Centre for Earth Resources Research (CERR) is a unit of the Earth Sciences Department of Memorial University which collaborates with industry and

government on matters related to earth resources. Oceans-related research at CERR includes shallow marine seafloor seismic profiling, identification and profiling of offshore petroleum resources and offshore exploration technology.

Fishing Technology Unit. The Marine Institute's Centre for Sustainable Aquatic Resources (C-SAR) focuses on research in harvesting technology, coastal zone management, ecosystem management and applied research. Working with local industry, government and international partners, C-SAR develops new technologies, techniques and expertise in the areas of fisheries conservation, selectivity and responsible harvesting. C-SAR is currently focused on projects that focus on fuel efficiency, reducing sea bottom impacts, eliminating bycatch, and size selectivity. The Centre's work with Fishery Products International on seabed friendly trawls recently won the U.S. National Fisheries Institute Award for responsible fishing.

GENESIS Group. The GENESIS Group Inc. is the technology transfer agency of Memorial University. Formerly the Seabright Corporation (established in 1982), the GENESIS Group is undertaking biotechnology research in the areas of antifreeze proteins for aquaculture purposes, pigmenting farmed fish, fish vaccinations, scallop hatchery technology, and the use of dietary factors to control fish reproduction.

Ocean Engineering Research Centre. This Centre (OERC), established in 1969, is an integral part of Memorial's Faculty of Engineering and Applied Science and has become a focus of the effort to establish ocean engineering as a new research and educational field in Canada.[46] OERC is involved in research, development, and consulting with application to most aspects of ocean engineering, including the offshore and naval architectural engineering industries. The main areas of interest in the Centre are: marine hydrodynamics and wave structure interaction; sea ice mechanics, iceberg and ice structure interaction; risk analysis in offshore systems; naval architectural aspects including vessel motions, propulsion and small craft problems; and ocean monitoring, acoustics, geotechnology and instrumentation.

Oceans Sciences Centre. The Ocean Sciences Centre is a cold ocean research facility located in Logy Bay near St. John's. The Centre houses laboratories where research is conducted on the North Atlantic fishery, aquaculture, oceanography, ecology, and fish behaviour and physiology. Research is also conducted on organisms ranging from bacteria to seals.

In addition to the research and development institutes identified above, other departments also conduct oceans-related research. For example, the Department of Physics maintains a Physical Oceanography Group (established in 1979), and the Department of Biology maintains a Whale Research Group (1978). More recently, the Social Sciences and Humanities Research Council of Canada and the Natural Science and Engineering Research Council of Canada, in partnership with

[46] Memorial University is the only university in Canada that offers a B.Eng. degree in Ocean and Naval Architectural Engineering and M.Eng. and Ph.D. degrees in Ocean Engineering.

Memorial University, commenced a five-year Coasts Under Stress project. Beginning in April 2000, this project will seek to identify the important ways in which changes in society and the environment in coastal British Columbia and coastal Newfoundland and Labrador have affected, or will affect, the health of people, their communities and the environment over the long term.

6.0 ECONOMIC IMPACT OF THE OCEANS SECTOR

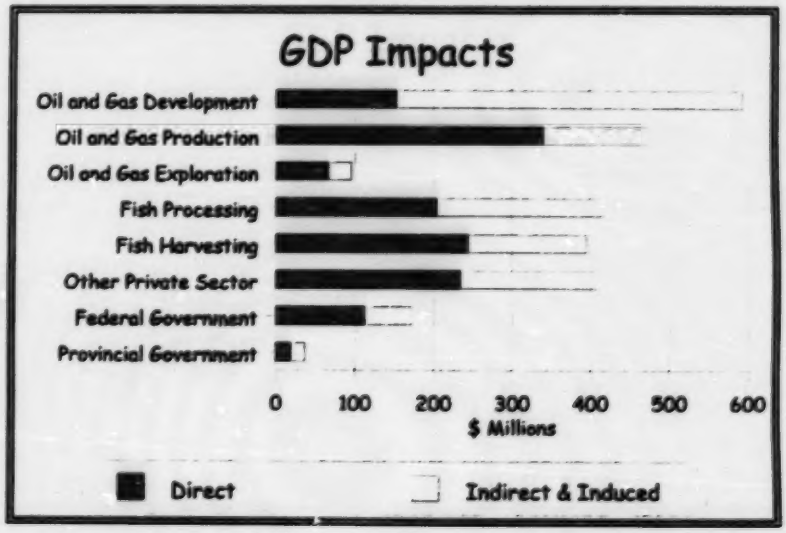
Sections Two to Five provided an overview of the major oceans-related private sector industries and public sector departments and agencies. While these Sections qualitatively outline the importance of these sectors to economic activity,[47] the data compiled for these sectors can be used to calculate economic impacts. To calculate economic impacts (specifically GDP, labour income and employment impacts), the Department of Finance used multipliers from both the Newfoundland and Labrador Econometric and Input-Output Models.

The industries used in the analysis are identified in Section 1.2. In reporting the findings of the analysis, the following industry groupings were used:[48]

- oil and gas development
- oil and gas production
- oil and gas exploration
- fish processing
- fish harvesting
- other private sector — this includes aquaculture, shipbuilding and ship repair, tourism, and marine transportation and related services
- federal government
- provincial government

6.1 GDP IMPACT[49]

The direct GDP impact of oceans-related activity averaged about $1.38 billion annually from 1997 to 1999 or 14.1 per cent of total economic activity which was $9.8 billion. Total GDP impact, including direct, indirect and induced effects, averaged about $2.59 billion over this period, or 26.5 per cent of total economic activity.



[47] As stated at the beginning of each Section, the associated quantitative data is included in Appendix 1.

[48] Detailed industry estimates beyond those presented in Sections 6.1 to 6.3 are contained in Appendix 2.

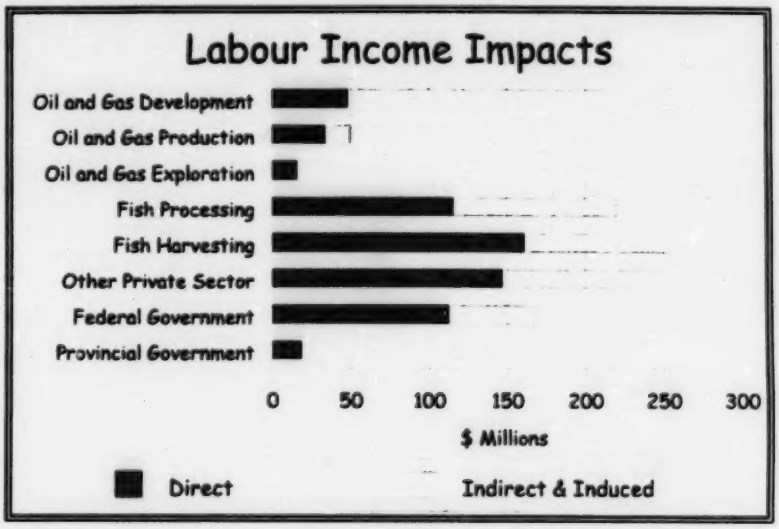
[49] The data used to develop the graphs in Sections 6.1 to 6.3 are presented in Appendix 2.

The most significant private sector industries, in terms of total GDP impact, were offshore oil (production, development and exploration) at 11.9 per cent of GDP and the fishery (harvesting and processing) at 8.2 per cent.[50]

Total public sector oceans-related activity contributed 2.2 per cent of GDP. Fisheries and Oceans Canada accounted for about 54 per cent of the public sector contribution, followed by Memorial University (including the Marine Institute) and the Department of National Defence.

6.2 LABOUR INCOME IMPACT

The direct labour income impact of oceans-related activity averaged about $650 million annually from 1997 to 1999 or 11.6 per cent of total labour income which was $5.6 billion. The total labour income impact, including direct, indirect and induced effects, averaged about $1.22 billion over this period, or 21.8 per cent of total labour income.



The most significant private sector industries, in terms of total labour income impact, were the fishery at 8.5 per cent and offshore oil activity at 5.2 per cent.[50] The relatively low contribution from the oil and gas industry, as compared to GDP, reflects the capital intensive nature of this industry. This difference can also be seen in employment impacts (Section 6.3). Total public sector oceans-related activity contributed 3.6 per cent of labour income.

6.3 EMPLOYMENT IMPACT

The direct employment (as measured in person years) impact of oceans-related activity averaged about 24,800 from 1997 to 1999 or 12.7 per cent of total employment which was 196,100. The total employment impact, including direct, indirect and induced effects, averaged about 44,400 over this period, or 22.6 per cent of total employment.

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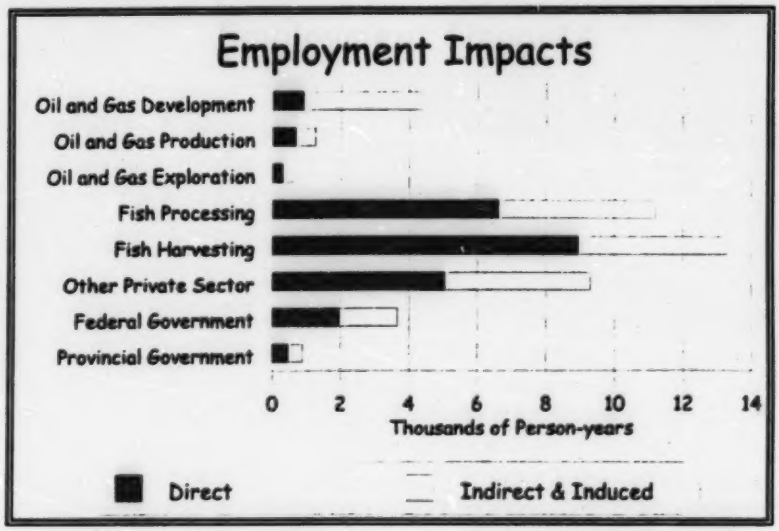
[50] When using individual industry impacts readers should consult ***Note on Individual Industry Impacts*** on page 12, in Section 1.3.

The most significant private sector industries included in this study, in terms of total employment impact, were the fishery at 12.4 per cent and offshore oil activity at 3.1 per cent.[50] The employment contribution from the fishery (12.4 per cent) was greater than its GDP or labour income contributions (8.2 per cent and 8.5 per cent, respectively). This reflects, in part, the labour intensive nature of this industry in the province. Total public sector oceans-related activity contributed 2.4 per cent of employment. Fisheries and Oceans Canada accounted for about 1.2 per cent, or almost one-half of the total public sector contribution.



7.0 CONCLUSIONS

The economy, environment and social fabric of Newfoundland and Labrador are intrinsically linked to the Atlantic Ocean and its resources. During the 1997-99 period, ocean related activities contributed, on average, $2.59 billion or 26.5 per cent to the province's GDP. In addition, 21.8 per cent of the province's labour income and 22.6 per cent of its employment were directly and indirectly linked to ocean-related activities.

Two industries — oil and gas, and the fishery — dominated Newfoundland and Labrador's oceans sector over the three year period studied. Combined, these two industries accounted for, on average, 20.1 per cent of economic activity (including indirect and spin-off impacts), 13.7 per cent of labour income, and 15.5 per cent of employment.

The contribution of oceans-related activity from other private sector industries, such as tourism, transportation, recreation and marine construction, were also important, contributing, on average, about 4.2 per cent of GDP, 4.6 per cent of labour income and 4.7 per cent of employment.

The public service plays an important role in the oceans sector in Newfoundland and Labrador. On a day-to-day basis, about 3,000 public servants from various departments and agencies and Memorial University work in oceans related activity. The public sector accounted for 2.2 per cent of GDP, 3.6 per cent of labour income, and 2.4 per cent of employment over the study period.

Offshore oil production has increased since 1999. During 2000, Hibernia oil production grew by 45 per cent from 1999. Current estimates indicate that Hibernia oil production could grow to 60 million barrels in 2002. Terra Nova, will add over 30 million barrels to production in 2002 and up to 47 million barrels at peak. This increased production activity will be complemented by development of other fields such as White Rose.

Increasing reliance on high valued shellfish, such as crab and shrimp, allowed the landed value of the fishery to reach a record high of $580.7 million in 2000. Despite recent market weakness, landed value was approximately $500 million in 2001. As well, aquaculture production grew to over 5,200 tonnes in 2001, compared to the previous peak of about 4,300 tonnes in 1999.

Growth in the oil and gas industry and the fishery has been complemented by increased employment, higher wages, and increased demand for indirect and spin-off goods and services. While this positively impacted the Services sector in general, in particular it was beneficial to firms engaged in ocean technologies and to research and development institutes focused on marine activity.

Appendix 1 - Public Sector Data

Table A1.1
The Oceans Sector in Newfoundland and Labrador
Public Sector Data, Average of 1997 - 1999

	Expenditures		Employment		Labour Income	
	$M	Per cent	PYs	Per cent	$M	Per cent
Federal Public Sector	**474.6**	**100.0%**	**2,491**	**100.0%**	**137.0**	**100.0%**
Fisheries and Oceans Canada	186.6	39.3%	1,178	47.3%	75.1	54.9%
Human Resources Development[51]	166.5	35.1%	141	5.6%	6.0	4.4%
Marine Atlantic	*66.6*	*14.0%*	*485*	*19.5%*	*21.4*	15.6%
Department of National Defence	16.3	3.4%	200	8.0%	10.2	7.4%
ACOA	12.5	2.6%	178	7.1%	6.2	4.5%
Transport Canada	4.8	1.0%	46	1.8%	2.4	1.8%
Natural Resources Canada	4.6	1.0%	38	1.5%	2.6	1.9%
Public Works and Government Services	3.5	0.7%	41	1.7%	3.5	2.5%
Environment Canada	2.1	0.4%	21	0.9%	1.1	0.8%
Royal Canadian Mounted Police	1.6	0.3%	42	1.7%	1.5	1.0%
Industry Canada/DFAIT	0.3	0.1%	2	0.1%	0.2	0.1%
Canadian Heritage - Parks Canada	0.3	0.1%	4	0.2%	0.2	0.2%
Agriculture and Agri-foods Canada	0.1	< 0.1%	1	< 0.1%	0.1	< 0.1%
Citizenship and Immigration Canada	0.1	< 0.1%	2	0.1%	0.1	0.1%
Justice Canada	0.1	< 0.1%	2	0.1%	0.1	0.1%
OCIPEP	0.1	< 0.1%	1	< 0.1%	0.1	< 0.1%
Provincial Public Sector	**29.9**	**100.0%**	**448**	**100.0%**	**18.3**	**100.0%**
Marine Institute/MUN	16.3	39.2%	256	57.1%	11.4	62.3%
Human Resources and Employment[51]	11.8	28.4%	1	0.2%	0.1	0.2%
Fisheries and Aquaculture	7.6	18.4%	110	24.5%	4.3	23.8%

[51] The expenditures from each of these Departments included early retirement payments to fishermen, resulting in large departmental expenditures relative to employment and labour income. These early retirement payments are not part of the direct impacts but would be partly captured in the estimates of the induced impacts.

Table A1.1 (Continued from page 45)
The Oceans Sector in Newfoundland and Labrador
Public Sector Data, Average of 1997 - 1999

	Expenditures		Employment		Labour Income	
	$M	**Per cent**	**PYs**	**Per cent**	**$M**	**Per cent**
Industry, Trade and Rural Development[52]	3.4	8.2%	55	12.2%	1.4	7.9%
Mines and Energy	1.0	2.5%	14	3.0%	0.6	3.3%
Youth Services & Post Secondary Education[53]	1.0	2.4%	2	0.4%	0.1	0.5%
Works, Services and Transportation	0.3	0.8%	8	1.7%	0.3	1.5%
Environment[54]	0.1	0.2%	3	0.7%	0.1	0.5%
Federal-Provincial Partnerships	**3.6**	**100.0%**	**34**	**100.0%**	**2.6**	**100.0%**
CNOPB[55]	3.6	100.0%	34	100.0%	2.6	100.0%

[52] This Department was restructured in February 2001 combining the former Departments of Industry, Trade and Technology, and Development and Rural Renewal.

[53] This Department, prior to February 2001, was part of the Department of Education.

[54] This Department, prior to February 2001, was a part of the Department of Environment and Labour.

[55] The CNOPB is included with the federal public sector for impact calculations.

Appendix 2 - Economic Impacts

Table A2.1
The Oceans Sector in Newfoundland and Labrador
Direct Economic Impacts, Average of 1997 - 1999

	GDP		Employment		Labour Income	
	$M	Per Cent of Total GDP	PYs	Per Cent of Total Employment	$M	Per Cent of Total Labour Income
Private Sector	**1,241.2**	**12.7%**	**22,391**	**11.5%**	**520.2**	**9.2%**
Oil Development	152.5	1.6%	883	0.5%	48.1	0.9%
Oil Production	339.6	3.5%	661	0.3%	33.7	0.6%
Oil Exploration	66.3	0.7%	281	0.1%	15.5	0.3%
Fish Processing	204.5	2.1%	6,600	3.4%	115.4	2.1%
Fish Harvesting	244.1	2.5%	8,933	4.6%	160.8	2.9%
Other Private Sector[56, 57]	234.3	2.3%	5,033	2.6%	146.8	2.4%
Federal Public Sector[57]	**115.4**	**1.2%**	**2,004**	**1.0%**	**115.4**	**2.1%**
Fisheries and Oceans Canada	75.2	0.8%	1,178	0.6%	75.2	1.3%
ACOA	6.2	0.1%	178	0.1%	6.2	0.1%
Environment Canada	1.1	< 0.1%	21	< 0.1%	1.1	< 0.1%
Department of National Defence	10.2	0.1%	200	0.1%	10.2	0.2%
Transport Canada	2.4	< 0.1%	46	< 0.1%	2.4	< 0.1%
Natural Resources Canada	2.6	< 0.1%	38	< 0.1%	2.6	< 0.1%
Other Federal Departments/CNC	17.7	0.2%	342	0.2%	17.7	0.5%
Provincial Public Sector[57]	**18.3**	**0.2%**	**448**	**0.2%**	**18.3**	**0.3%**
Department of Fisheries and Aquaculture	4.4	< 0.1%	110	0.1%	4.4	0.1%
Industry, Trade and Rural Development	1.4	< 0.1%	55	< 0.1%	1.4	< 0.1%
Other Provincial Departments	1.1	< 0.1%	27	< 0.1%	1.1	< 0.1%
Memorial University	11.4	0.1%	256	0.1%	11.4	0.2%
TOTAL	**1,375.0**	**14.1%**	**24,843**	**12.7%**	**653.9**	**11.6%**

[56] "Other Private Sector" includes aquaculture, shipbuilding and repair, tourism and marine transportation and related services.

[57] Data limitations prevented the separation of public and private marine transportation and related services. As a result, public ferry services, ports and harbours management impacts have been included in the private sector impacts (under "Other Private Sector").

Table A2.2
The Oceans Sector in Newfoundland and Labrador
Total Economic Impacts, Average of 1997 - 1999[58]

	GDP		Employment		Labour Income	
	$M	Per Cent of Total GDP	PYs	Per Cent of Total Employment	$M	Per Cent of Total Labour Income
Private Sector	**2,378.3**	**24.3%**	**39,795**	**20.2%**	**1,019.5**	**18.2%**
Oil Development	593.8	6.1%	4,339	2.2%	222.0	3.9%
Oil Production	472.9	4.8%	1,243	0.6%	49.7	0.9%
Oil Exploration	95.8	1.0%	570	0.3%	22.2	0.4%
Fish Processing	414.6	4.2%	11,161	5.7%	219.3	3.9%
Fish Harvesting	394.6	4.0%	13,233	6.7%	253.3	4.6%
Other Private Sector[59,60]	406.6	4.2%	9,248	4.7%	253.0	4.6%
Federal Public Sector[60]	**176.8**	**1.8%**	**3,730**	**1.9%**	**171.2**	**3.0%**
Fisheries and Oceans Canada	115.1	1.2%	2,269	1.2%	111.5	2.0%
ACOA	9.5	0.1%	289	0.1%	9.2	0.2%
Environment Canada	1.7	< 0.1%	38	< 0.1%	1.6	< 0.1%
Department of National Defence	15.6	0.2%	358	0.2%	15.1	0.3%
Transport Canada	3.7	< 0.1%	83	< 0.1%	3.6	0.1%
Natural Resources Canada	4.0	< 0.1%	75	< 0.1%	3.8	0.1%
Other Federal Departments/CNOPB	27.2	0.3%	617	0.4%	26.3	0.3%
Provincial Public Sector[60]	**36.6**	**0.4%**	**884**	**0.5%**	**33.6**	**0.6%**
Fisheries and Aquaculture	8.7	0.1%	216	0.1%	8.0	0.1%
Industry, Trade and Rural Development	2.9	< 0.1%	100	0.1%	2.6	< 0.1%
Other Provincial Departments	2.2	< 0.1%	53	< 0.1%	2.0	< 0.1%
Memorial University	22.8	0.2%	515	0.3%	21.0	0.4%
TOTAL	**2,591.7**	**26.5%**	**44,408**	**22.6%**	**1,224.3**	**21.8%**

[58] When using individual industry impacts readers should consult ***Note on Individual Industry Impacts*** on page 12, Section 1.3.

[59] "Other Private Sector" includes aquaculture, shipbuilding, boatbuilding, tourism and marine transportation and related services.

[60] Data limitations prevented the separation of public and private marine transportation and related services. As a result, public ferry services, ports and harbours management impacts have been included in the private sector impacts (under "Other Private Sector").

Appendix 3 - Private Sector Data Sources

A list of the industries included and the sources of data follows.

Oil and Gas exploration: GDP data was developed using exploration expenditures provided by the Canada-Newfoundland Offshore Petroleum Board (CNOPB) and GDP data for "Service Industries Incidental to Mineral Extraction" from Statistics Canada. Employment data was provided by the CNOPB. Labour income was estimated by the Department of Finance using employment data and an estimate of average weekly earnings.

Oil and Gas Development: GDP data for 1997 (the most recent year available for nominal GDP data) was taken from Statistics Canada for the industry "Gas and Oil Facility Construction". The 1998 and 1999 data was developed using the 1997 data and development expenditures from CNOPB. Employment data was provided by the CNOPB. Labour income was estimated by the Department of Finance using employment data and an estimate of average annual earnings.

Oil and Gas Production: GDP data for 1997 was taken from Statistics Canada for the industry "Crude Petroleum and Natural Gas Industries". The 1998 and 1999 data was developed using the 1997 data and estimates of value of production. Employment data was provided by the CNOPB. Labour income was estimated by the Department of Finance using employment data and an estimate of average annual earnings.

Primary Fishing: GDP data for 1997 was taken from Statistics Canada for the industry "Fishing and Trapping Industries". (We know that trapping constitutes only a very small portion of GDP in this industry in Newfoundland and Labrador.) The 1998 and 1999 data was developed using the value of fish landings. Employment data comes from Statistics Canada's Labour Force Survey. Labour income was obtained from the Labour Income division of Statistics Canada.

Fish Processing: GDP data for 1997 was taken from Statistics Canada for the industry "Fish Products Industry". The 1998 and 1999 data was developed using the production value of fish products, as supplied by the Department of Fisheries and Aquaculture. Employment data comes from Statistics Canada's Labour Force Survey. Labour Income was obtained from the Labour Income division of Statistics Canada.

Aquaculture: GDP, employment and labour income was obtained from Statistics Canada's Canadian Aquaculture Industry Survey.

Boatbuilding: GDP, employment and labour income was obtained from Statistics Canada's Annual Survey of Manufacturers. Years used for this industry were 1996 and 1998 since data in other years was suppressed.

Shipbuilding: Estimates of GDP were calculated in-house by the Department of Finance based on information supplied by the Department of Industry Trade and Rural Development (ITRD). Employment and income data was also supplied by ITRD.

Water Transportation: Estimates of GDP were calculated in-house by the Department of Finance based on information supplied by Marine Atlantic, Department of Works, Services and Transportation and by the Port of St. John's. Employment data comes from Statistics Canada's Labour Force Survey. Labour income was calculated using employment data and estimated average weekly earnings.

Cargo Handling: This data was taken from Statistics Canada, *Shipping in Canada*.

Tourism: Estimates of GDP, employment and labour income were estimated in-house by the Department of Finance using information from the Department of Tourism, Culture and Recreation's 1997 air and auto exit surveys for non-resident activity and the Canadian Travel Survey (Statistics Canada) for resident activity.[61]

[61] The exit surveys include four activities which were identified as being oceans related: boat touring, whale watching, iceberg viewing and sea kayaking. Estimates indicate that about 47 per cent of non-resident auto visitors and 36 per cent of non-residents air visitors engage in oceans related activity.